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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of: Nasser-Ghodsi et al.

Attorney Docket No.: KLA1P041/P773

Patent: 6,801,596 B2

Issued: October 5, 2004

Title: METHODS AND APPARATUS FOR VOID  
CHARACTERIZATION

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first-class mail on November 17, 2004 in an envelope addressed to the Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450.

Signed: *Aurelia M. Sanchez*

Aurelia M. Sanchez

**REQUEST FOR CERTIFICATE OF CORRECTION  
OF OFFICE MISTAKE  
(35 U.S.C. §254, 37 CFR §1.322)**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450  
Attn: Certificate of Correction

**Certificate  
NOV 30 2004  
of Correction**

Dear Sir:

Attached is Form PTO-1050 (Certificate of Correction) at least one copy of which is suitable for printing. The errors together with the exact page and line number where they occur, and shown correctly in the application filed, are as follows:

**CLAIMS:**

1. In line 13 of claim 1 (column 11, line 18) change "x-ray is" to --x-ray measurement is--. This appears correctly in the Response to Office Action as filed on page 2, paragraph 4, line 2.
2. In line 12 of claim 11 (column 11, line 55) change "control for" to --control measurement for--. This appears correctly in the Response to Office Action as filed on page 3, paragraph 1, line 4.

DEC 03 2004

Patentee hereby requests expedited issuance of the Certificate of Correction because the error lies with the Office and because the error is clearly disclosed in the records of the Office. As required for expedited issuance, enclosed is documentation that unequivocally supports the patentee's assertion without needing reference to the patent file wrapper.

It is noted that the above-identified errors were printing errors that apparently occurred during the printing process. Accordingly, it is believed that no fees are due in connection with the filing of this Request for Certificate of Correction. However, if it is determined that any fees are due, the Commissioner is hereby authorized to charge such fees to Deposit Account 500388 (Order No. KLA1P041).

Respectfully submitted,  
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### IN THE CLAIMS

Claims 1, 11, 24, and 37 have been amended. No new matter is believed introduced.

1. (Currently Amended) An apparatus for characterizing a void in a first scan target associated with a sample, the sample having a first surface and a second surface, the apparatus comprising:

an x-ray emission inducer configured to scan a first scan target, the x-ray emission inducer causing the first scan target to emit x-rays from the first surface;

a current detection system configured to measure generated current caused by the x-ray emission inducer;

an x-ray emission detection system configured to obtain a measurement of the x-rays emitted from the first surface of the sample, wherein the x-ray measurement is compared to a control measurement to characterize a void in the first scan target.

2. (Original) The apparatus of claim 1, further comprising a stage configured to secure the sample, wherein the stage is configured to position the sample relative to the x-ray emission inducer.

3. (Original) The apparatus of claim 2, wherein positioning the sample comprises rotating the sample.

4. (Original) The apparatus of claim 2, wherein the first scan target comprises a via.

5. (Original) The apparatus of claim 4, wherein the sample is a wafer comprising a plurality of integrated circuits.

6. (Original) The apparatus of claim 1, wherein the x-ray emission detection system is configured to detect x-rays with a first emission energy corresponding to the a-first material.

7. (Original) The apparatus of claim 6, wherein the first material comprises Cu.

8. (Original) The apparatus of claim 7, wherein the x-ray emission detection system is further configured to detect x-rays with a second emission energy corresponding to the a second material.

9. (Original) The apparatus of claim 8, wherein the second material comprises Ta.

10. (Original) The apparatus of claim 9, wherein the control measurement is obtained by scanning an adjacent scan target.

11. (Currently Amended) A system for characterizing voids associated with a sample, the sample having a first surface and a second surface, the system comprising:  
memory;

a processor coupled with memory, the processor configured to measure generated current caused by the x-ray emission inducer, identify a first measurement of induced x-ray emissions characteristic of a first material at a first scan target, identify a control measurement, and provide the first measurement and the control measurement for comparison to thereby obtain information for characterizing a void associated with the first scan target in the sample.

12. (Original) The system of claim 11, wherein the first material has low resistivity.

13. (Original) The system of claim 12, wherein the first material is copper.

14. (Original) The system of claim 11, wherein the sample is a wafer comprising a plurality of integrated circuits.

15. (Original) The system of claim 11, further comprising identifying a second measurement of x-ray emissions characteristic of a second material.

16. (Original) The system of claim 11, wherein the second material is a barrier material.

17. (Original) The system of claim 16, wherein the second material is Ta.

18. (Original) The system of claim 11, wherein characterizing voids associated with the sample comprises determining the size and location of a void.

19. (Original) The system of claim 11, wherein the control measurement is obtained by scanning an adjacent scan target.

20. (Original) The system of claim 19, wherein the scan target is a via.

21. (Original) The system of claim 20, wherein the adjacent scan target is an adjacent via.

22. (Original) The system of claim 21, wherein the control measurement is obtained by scanning adjacent vias in the +x, -x, +y, and -y positions.

23. (Original) The system of claim 22, wherein the control measurement is obtained by scanning adjacent vias in the +2x, -2x, +2y, and -2y positions.

24. (Currently Amended) A method for characterizing a void in a sample, the method comprising:

measuring generated current on an electrically isolated stage, the generated current caused by the x-ray emission inducer;

identifying a first measurement of induced x-ray emissions characteristic of a first material at a first scan target;

identifying a control measurement;

providing the first measurement and the control measurement for comparison to thereby obtain information for characterizing a void associated with the first scan target in the sample.

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(Also Form PT-1050)

## UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO. : 6,801,596 B2

DATED : October 5, 2004

INVENTOR(S) : Nasser-Ghodsi et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

### In the Claims:

In line 13 of claim 1 (column 11, line 18) change "x-ray is" to --x-ray measurement is--.

In line 12 of claim 11 (column 11, line 55) change "control for" to --control measurement for--.

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PATENT NO. 6,801,596 B2

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